

KEPLER OBSERVATIONS OF FLARES ON SOLAR-TYPE STARS

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We have found solar-type stars (G and K stars on and near the main sequence) in the Kepler Q1 data release that exhibit dramatic flares, with energies at least ~100 to 1,000 times those seen in the largest solar flares. These flaring stars are worth examining in much greater detail, both to understand better the physics of flaring, and to understand why these particular stars exhibit this extraordinary behavior and what that may mean for the nearby environments of these stars. If they are, in fact, the youngest stars in the Kepler sample, then these flares are putting energies into their surrounding environments at a critical phase in planet formation. However, we believe for several reasons that these stars are not simply the youngest stars in the Kepler sample and are likely to be older stars. If that is true then we are witnessing solar-type stars exhibit behavior not ever seen before, and there are important implications. Our working hypothesis is that these stars show flares episodically. This proposal has been written to ensure continued observation of the flaring stars, to ensure access to those data, and to obtain one-minute cadence observations of a subset of the flaring stars in order to derive precise physical parameters for these extraordinary objects and to better study the flares themselves. That can then permit gaining a fuller understanding of the context of the extraordinary flaring behavior.